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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/653,156	08/31/2000	Vishnu K. Agarwal	MI22-1518	4650

21567 7590 05/10/2002

WELLS ST. JOHN P.S.
601 W. FIRST
SUITE 1300
SPOKANE, WA 99201-3828

EXAMINER

HUYNH, YENNHU B

ART UNIT	PAPER NUMBER
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2813

DATE MAILED: 05/10/2002

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/653,156

Applicant(s)

AGARWAL ET AL.

Examiner

Yennhu B. Huynh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 March 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 9 & 10.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claims 16-26 have been cancelled by Amendment filed on 3/5/02.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chi (U.S. 6174770B1) in view of Raaijmakers et al. (2001/0024387A1).

Chi at figs. 1-5 in related text col.1-4 disclose a method for making a DRAM capacitor, which is included steps of forming an opening 113 in an insulative layer 111 over a substrate; the opening having side and bottom (fig.1); forming a polysilicon layer 201 over the side and bottom of opening 113; removing the polysilicon layer over the bottom of the opening (col. 1, 3); converting at least some of the polysilicon layer 201 to HSG (col.3, fig. 2); conformally forming a first capacitor electrode 301 on the converted polysilicon (col.1), the first electrode being sufficiently thin that the first electrode having an inner surface area per unit area and an outer surface area per unit area that are both greater than an outer surface area per unit area of the substrate ((fig,4, col.3); forming a capacitor dielectric 401 on the first electrode and a second capacitor electrode 403 over the dielectric layer.

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However, Chi does not disclose the use of TiN instead of polysilicon for bottom electrode, and the capacitor dielectric layer comprises of Ta₂O₅, ZrO₂, WO₃, Al₂O₃ HfO₂, barium strontium titanate, or strontium titanate, instead of nitride or oxide.

Raaijmakers et al. at figs. 1-10 in related text col. 1-16 disclose the formation of either TiN bottom electrode [0013]; capacitor dielectric material selected from the group of either Si₃N₄, SiO₂ or Ta₂O₅, BST and other dielectric materials can be used [0016]. Raaijmakers also disclose chemisorbing a layer of a first precursor at monolayer thick in substrate [0062], and a second precursor [0067] at monolayer thick and a chemisorption product of the first and second precursor layer comprised by the first electrode [0077, 0080-0082, 00134, 0136].

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have replaced dielectric layer of nitride or oxide and bottom electrode of polysilicon from Chi with Ta₂O₅, BST and other dielectric materials; and TiN for bottom electrode, since the substitution of art recognized equivalence as suggested by Raaijmakers et al., would be within level of those skilled in the art. This modification would complete the capacitor fabrication methods as claimed invention.

Conclusion

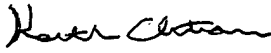
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yennhu Huynh whose telephone number is (703)308-6110. The examiner can normally be reached on Monday-Friday from 8:30 AM to 7.00PM.

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If attempts to reach the examiner by telephone are unsuccessfully, the examiner's supervisor, Olik Chaudhuri, can be reached on (703) 306-2794. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-3432.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

YNBH
5/3/02


KEITH CHRISTIANSON
PRIMARY EXAMINER